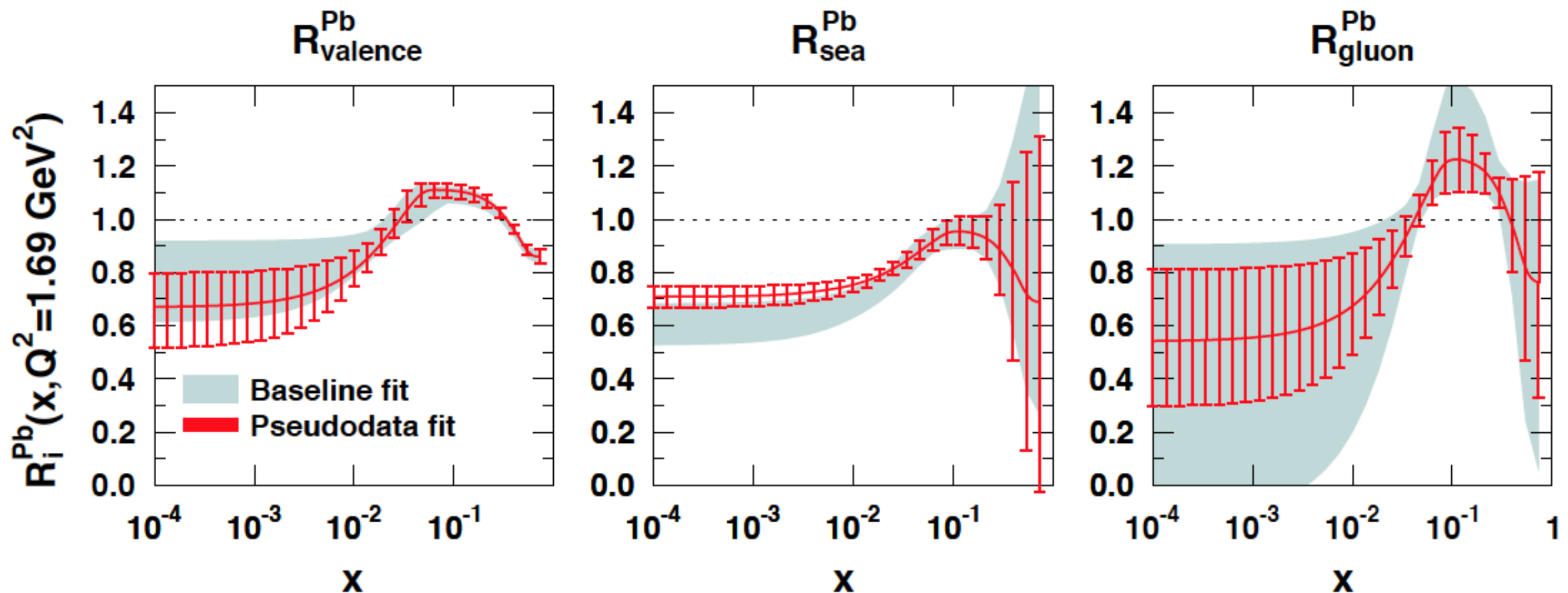


An update on F_2^c

M.A. C. Lamont
BNL

Motivation for measuring F_2^c

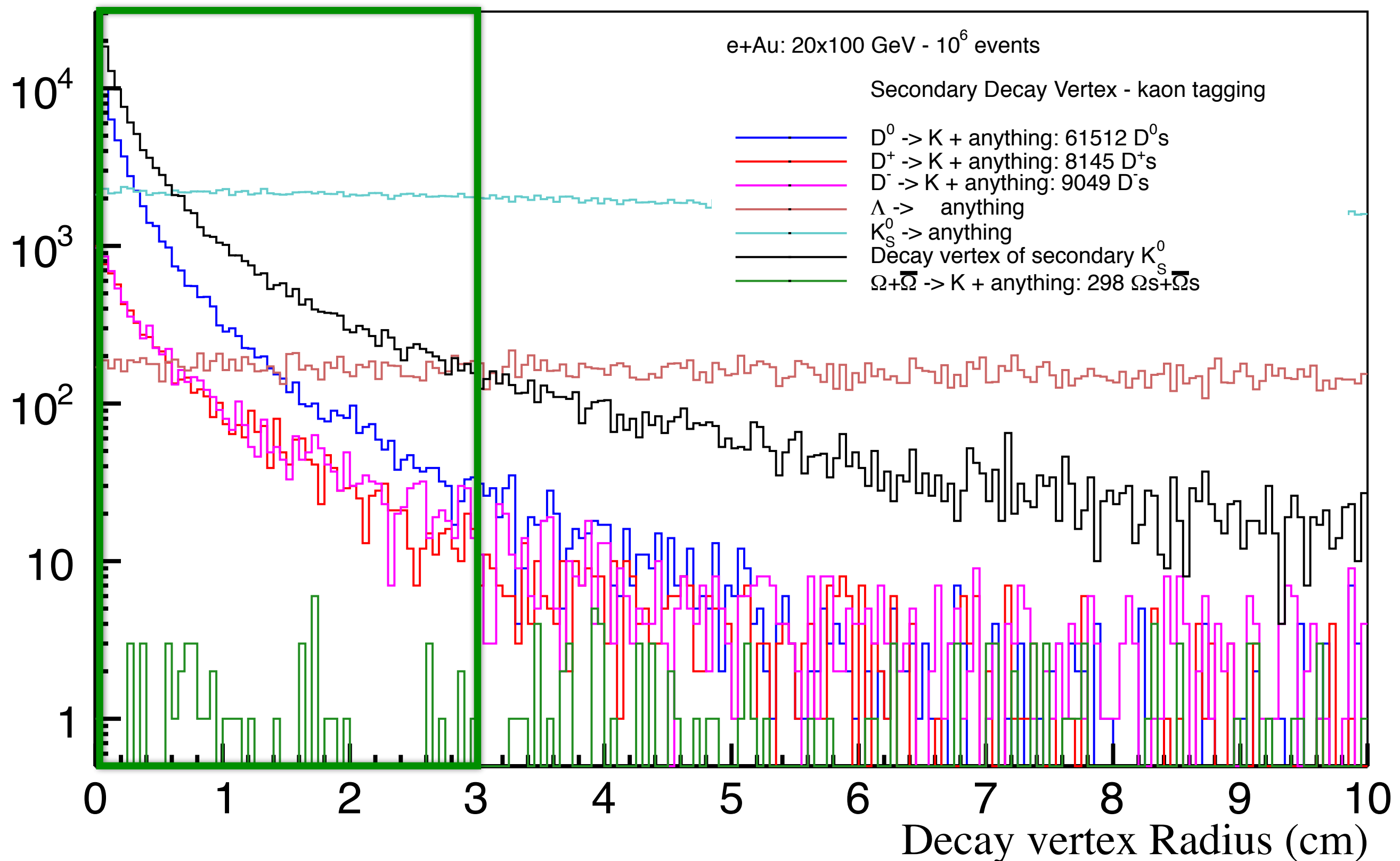
- By measuring the structure functions, we can constrain the uncertainties in the theoretical description of the partons.
- So far, our measurement of F_2 has some constraints, but doesn't go to low enough x as we would like.
- Large mass of the c quark means that you can go to lower x, Q^2 values theoretically
- From Hannu:



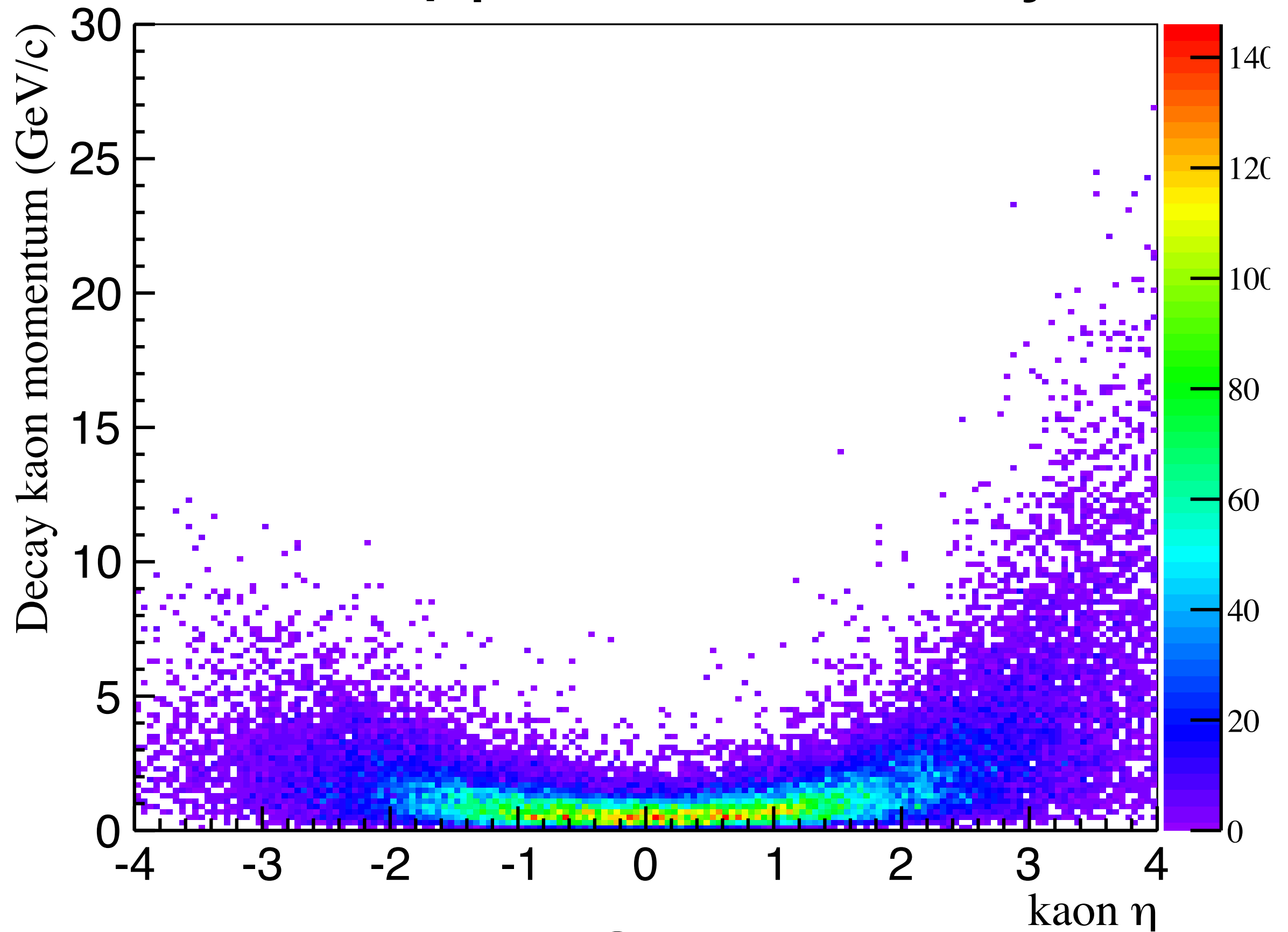
Measuring Charm

- The most abundant charm particles are the D-mesons.
 - ➔ We can measure D mesons via a displaced decay vertex by reconstructing their daughter particles
 - ➔ Additionally, at an EIC we can measure them through their charged daughter particles
 - ➔ kaons at low momenta and at mid-rapidity via dE/dx in the TPC;
 - ➔ at larger momenta in a RICH (both mid- and forward/backward- rapidities)
 - ▶ D^0 : K^\pm + anything: 58.1%
 - ▶ D^\pm : K^\pm + anything: 31.6%

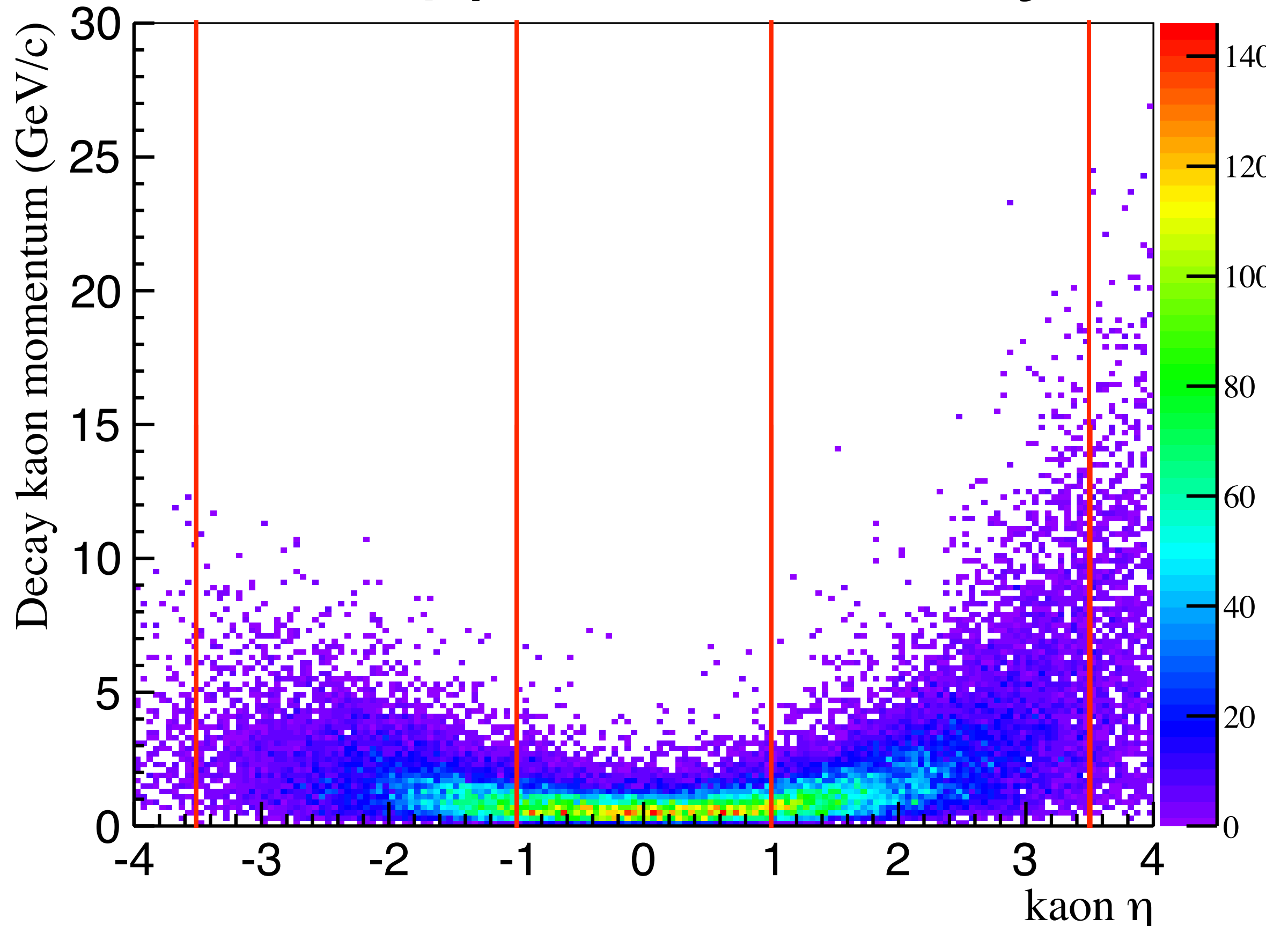
Decay vertices by particle



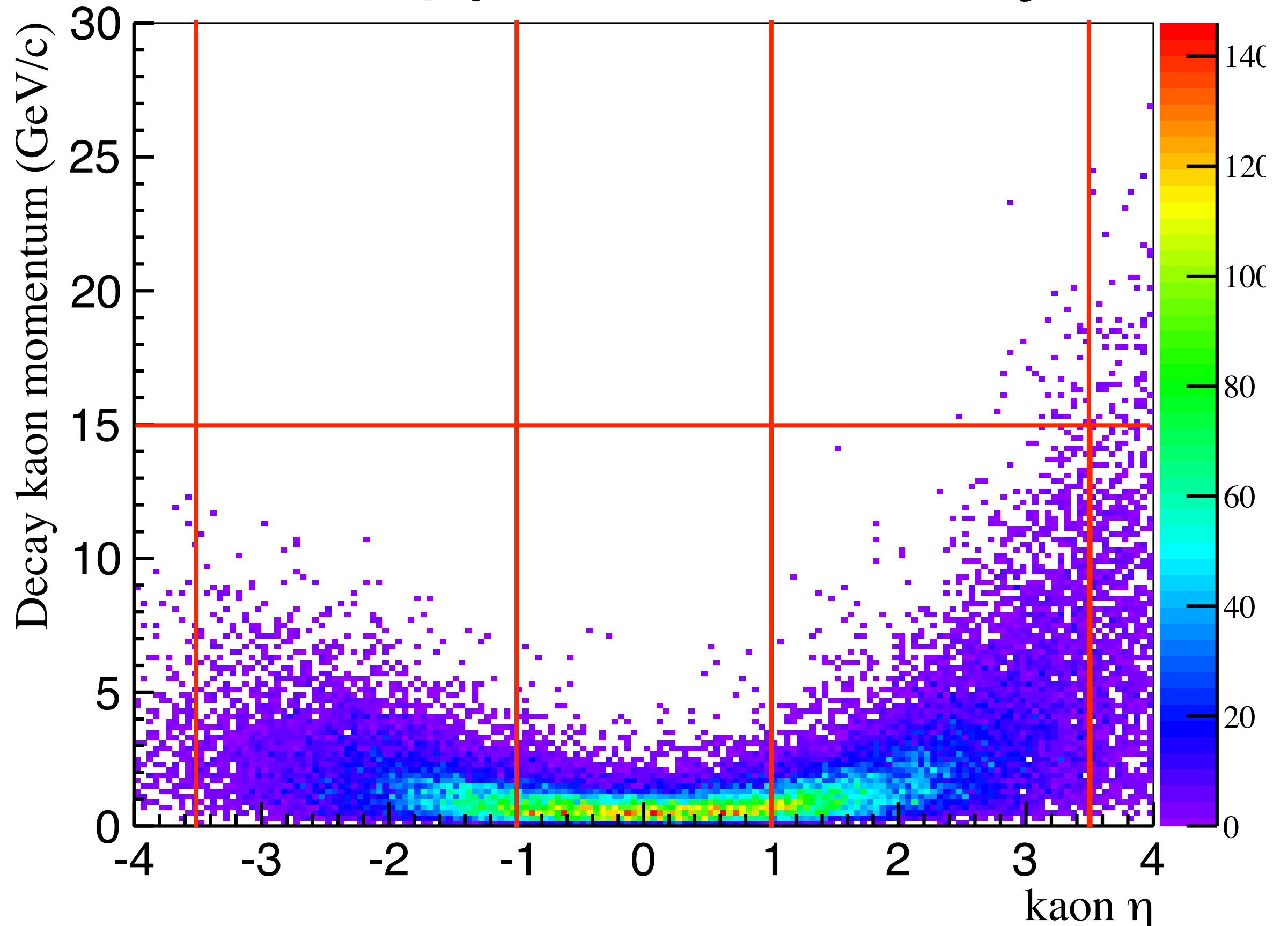
Kaon η -p from D^0 decays



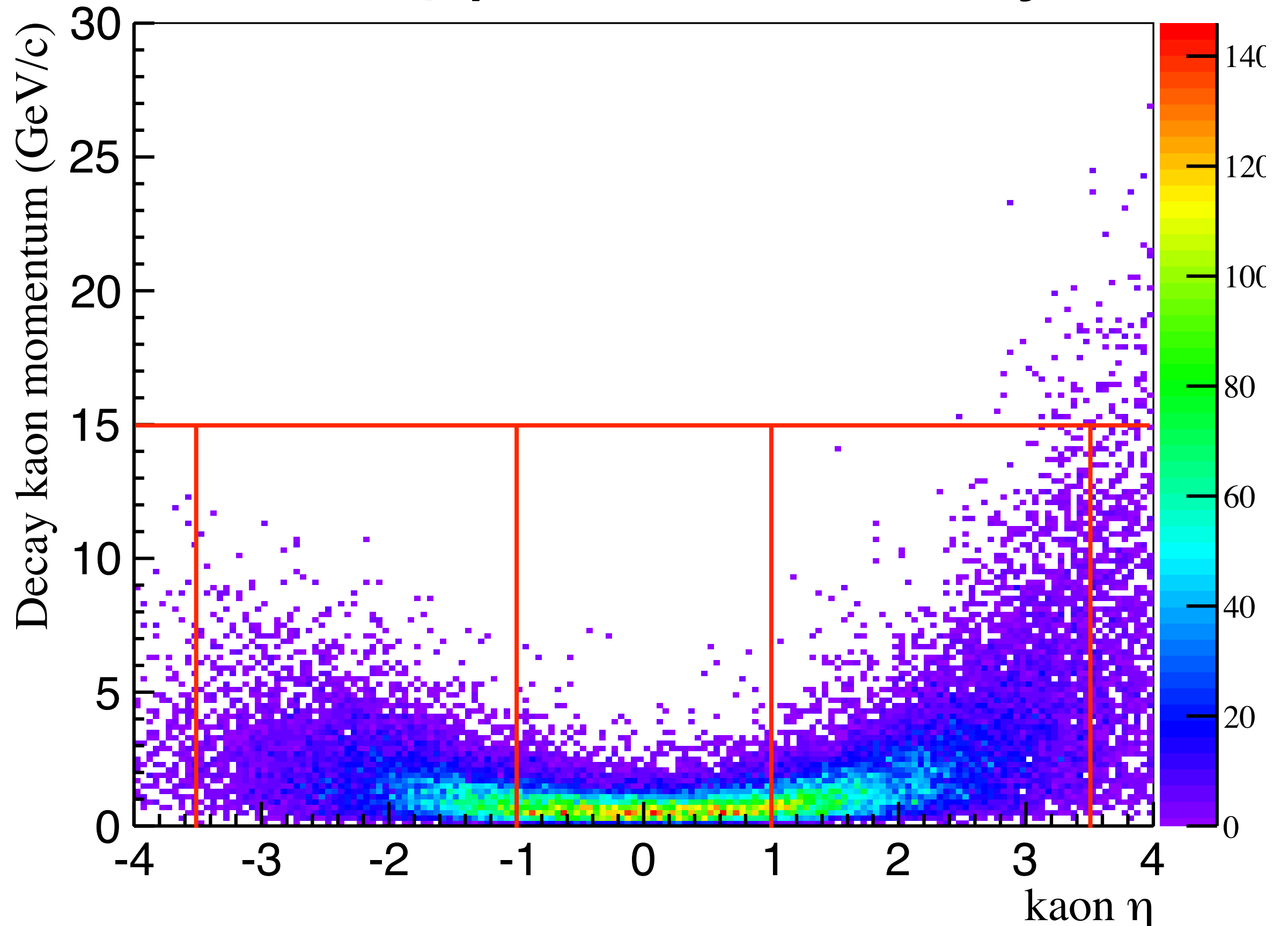
Kaon η -p from D^0 decays



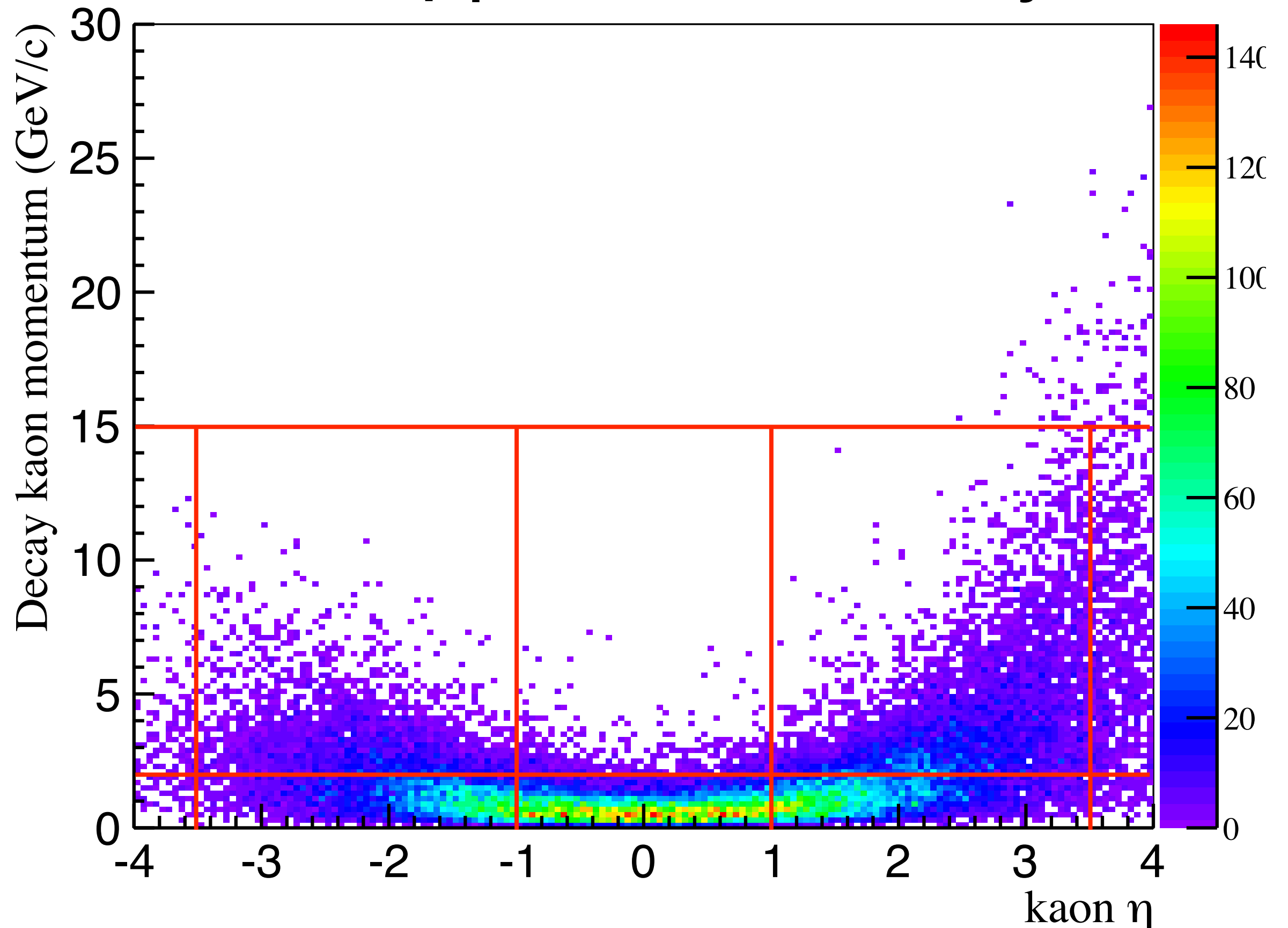
Kaon η -p from D^0 decays



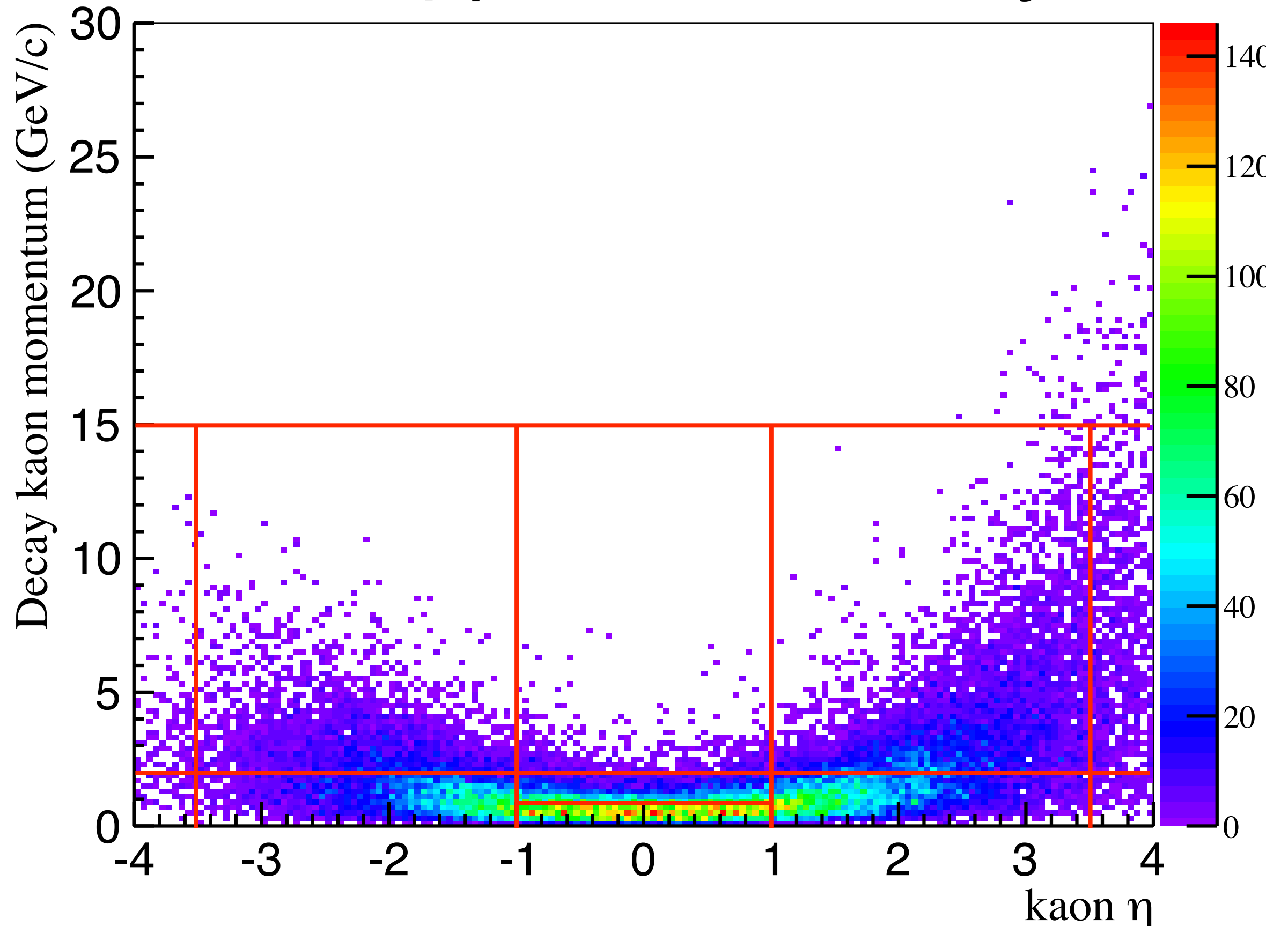
Kaon η -p from D^0 decays



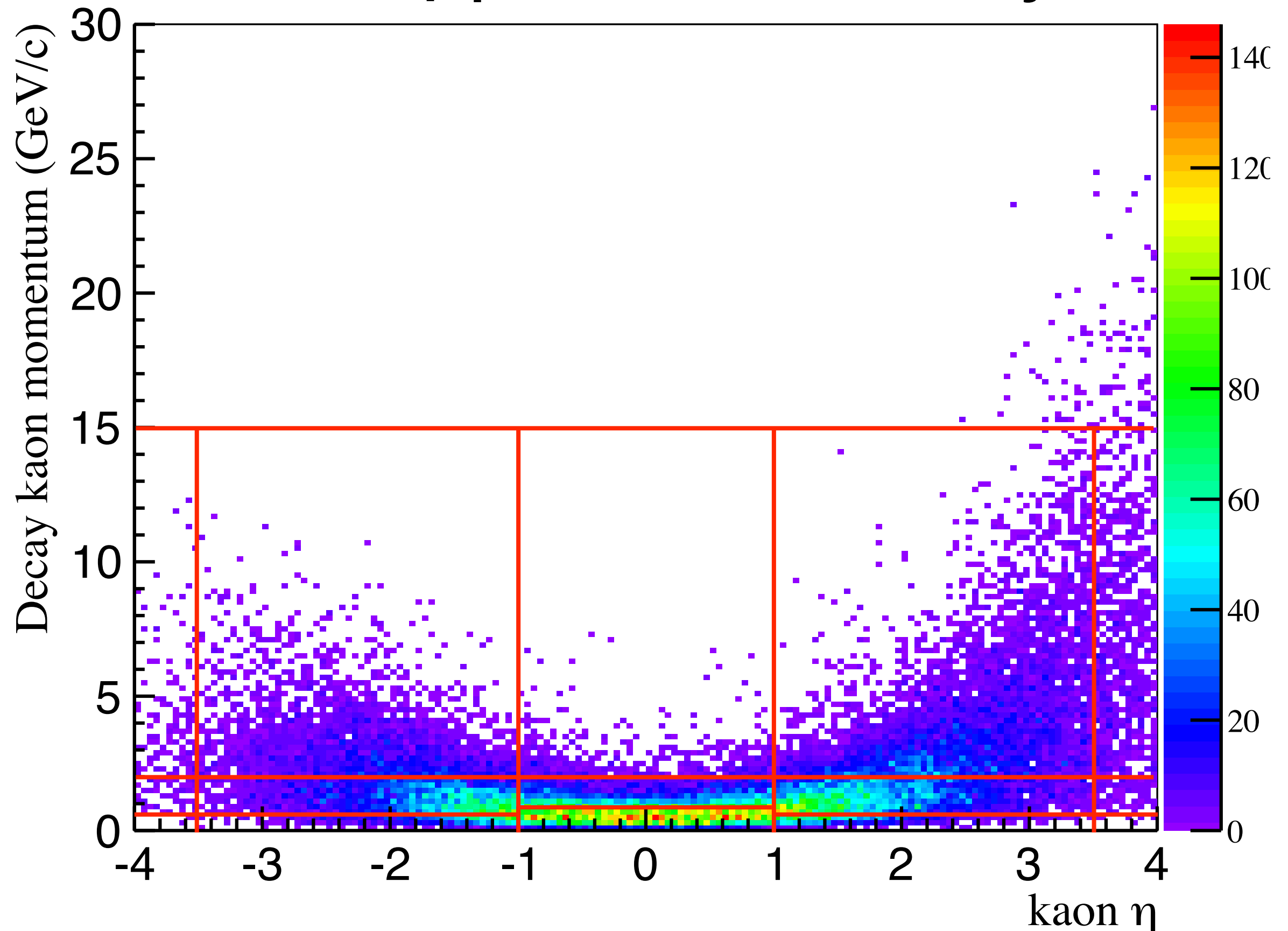
Kaon η -p from D^0 decays



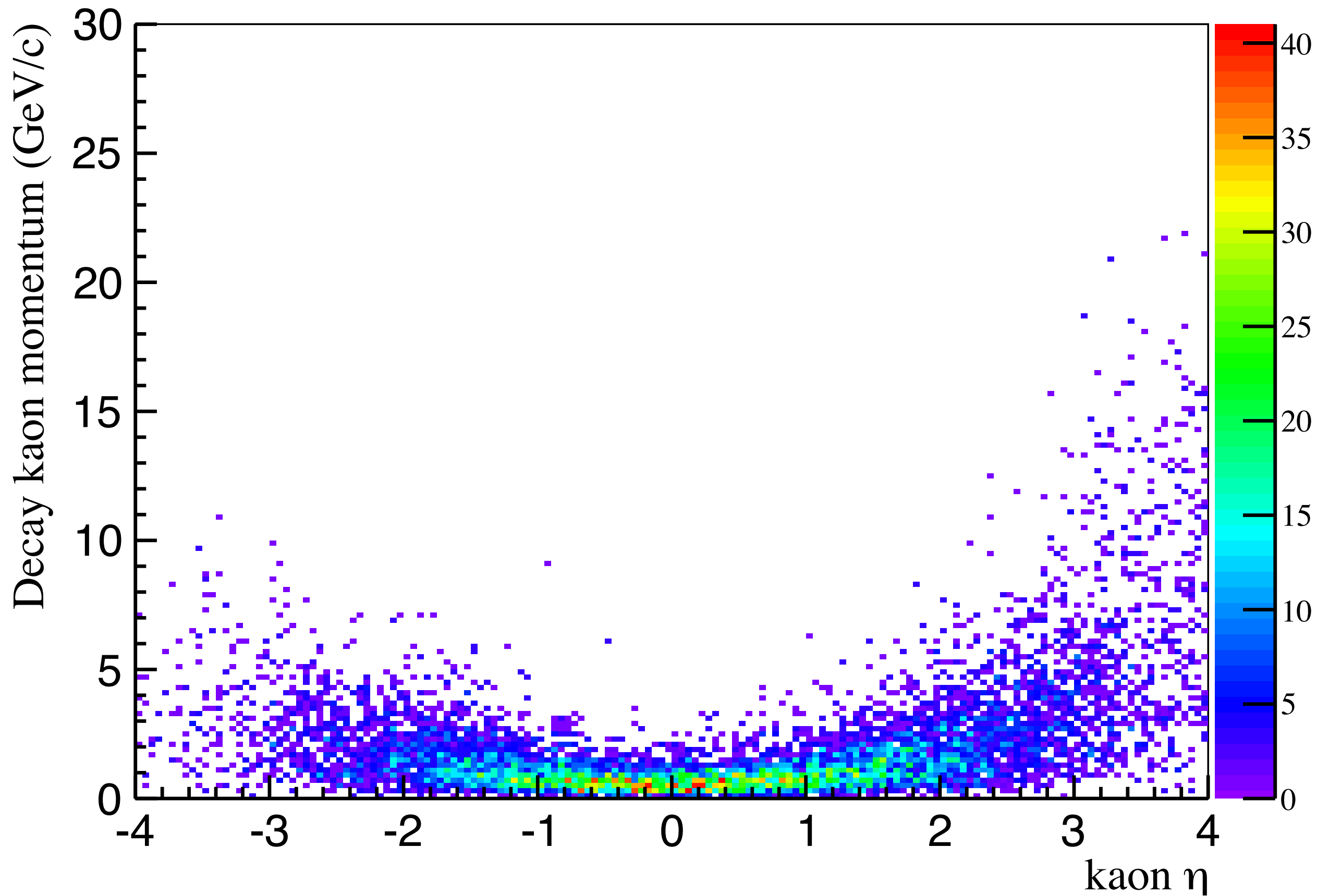
Kaon η -p from D^0 decays



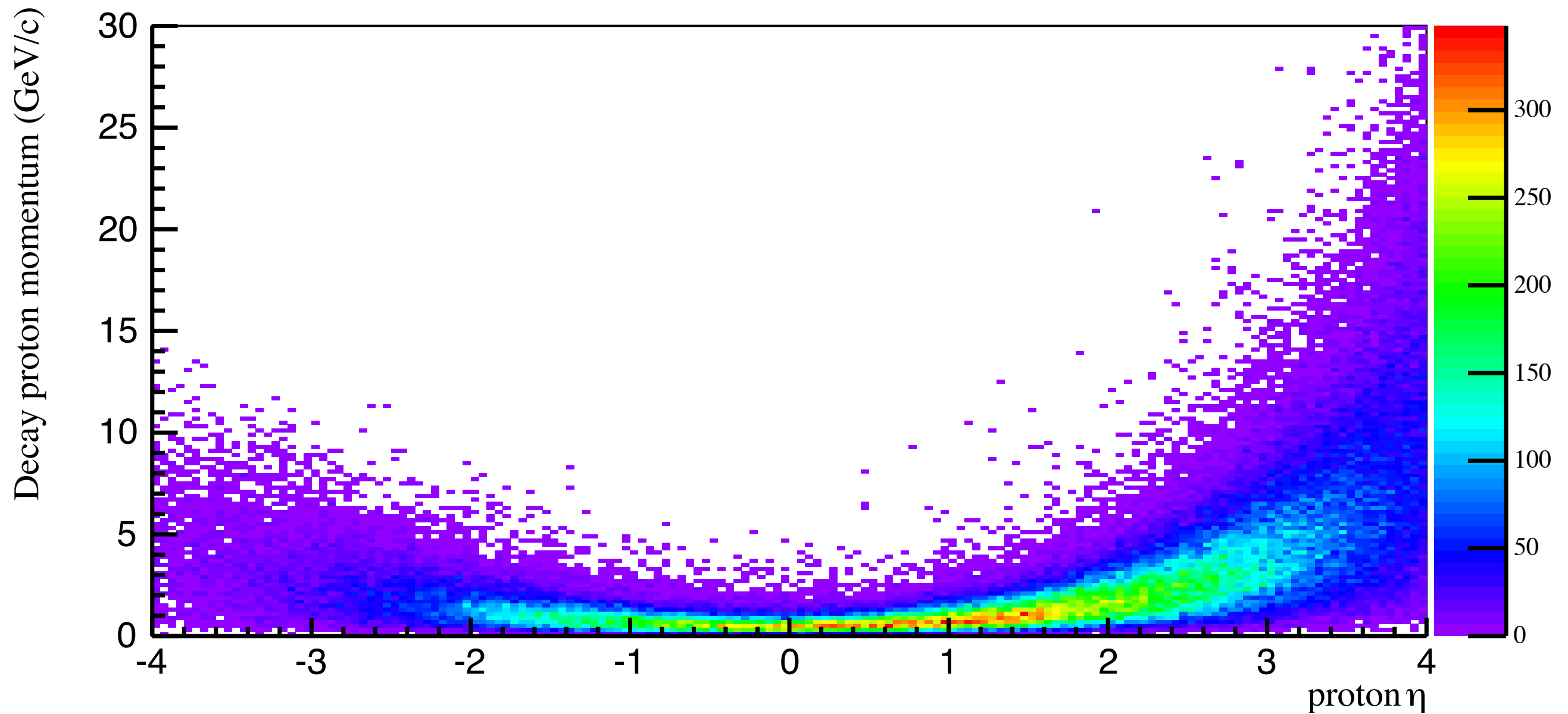
Kaon η -p from D^0 decays



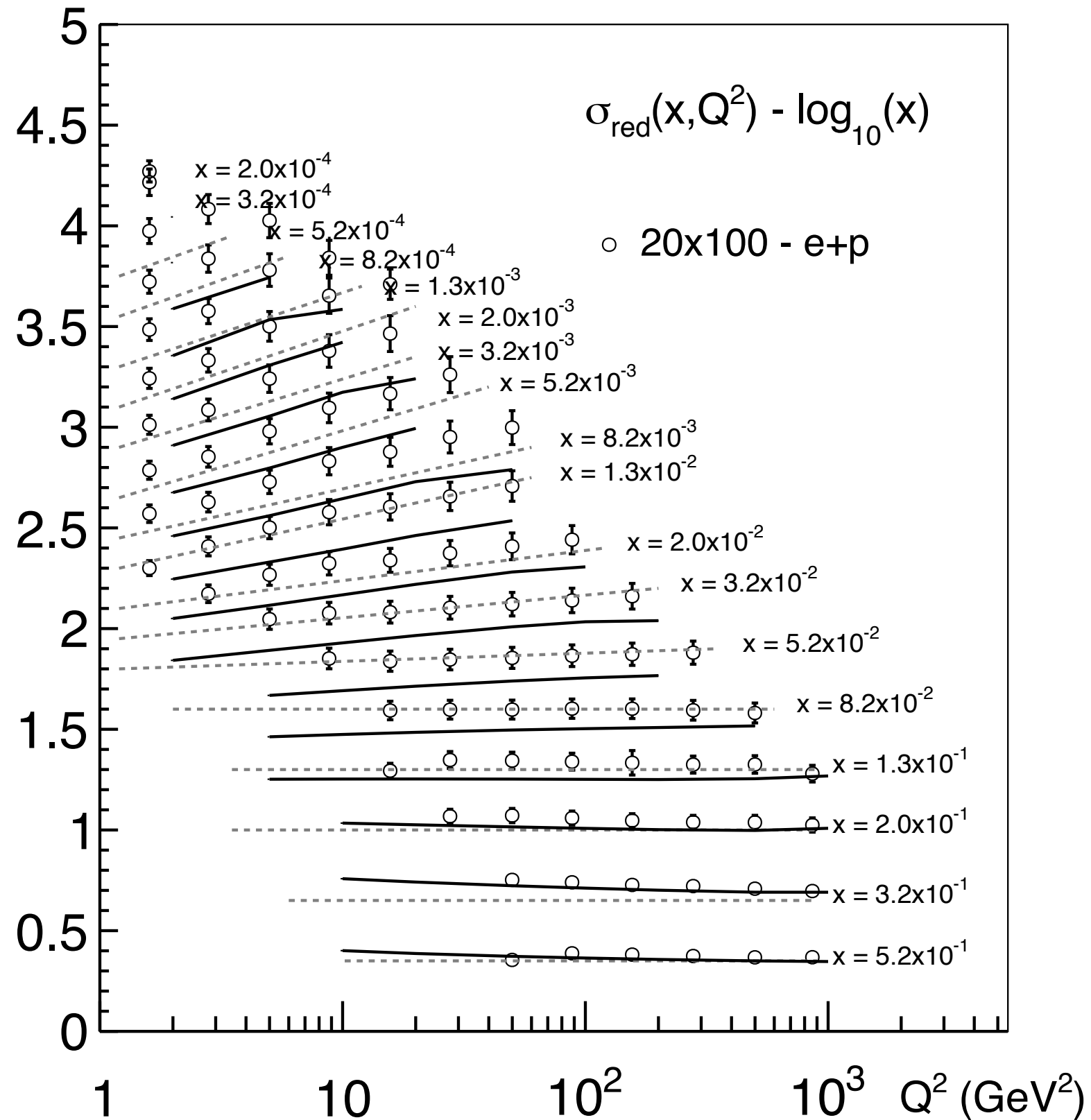
Kaon η -p from D^\pm decays



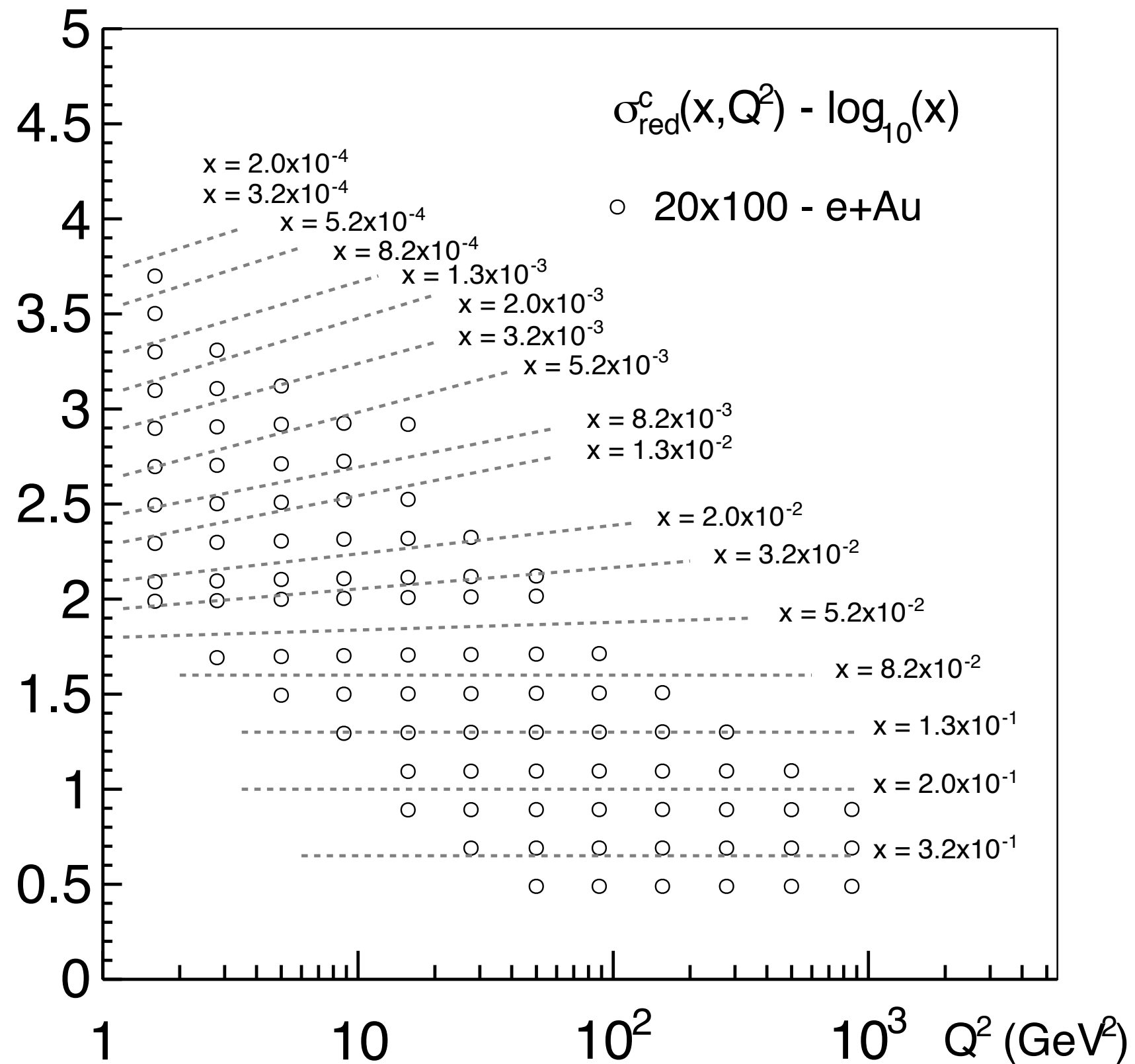
Proton η -p from Λ decays



Reduced Cross-Section - no charm cuts



Reduced Cross-Section - with charm cuts



How are our statistics affected?

- Still dominated by systematic errors, even which requiring charm.
 - ➡ Saw previously that statistical error hardly affected even when reducing statistics by 10^4
- Requiring a D^0 , D^\pm reduces the available statistics by a factor of ~ 15 .
- Applying all momentum and vertex cuts reduces this again by a factor of ~ 2 .
- However, in the experiment, we don't know its a charm, so just by requiring a decay vertex and momentum cuts increases the statistics by a factor of ~ 2.5 .
 - ➡ This increases the systematic error on our measurement significantly
 - ➡ Even without the proton, this ratio is ~ 3